



RESEARCH REPORT

Greek adaptation and validation of the Patellofemoral Pain Syndrome Severity Scale



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KEYWORDS

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Abstract The purpose of this study was to cross-culturally adapt and validate the Greek version of the Patellofemoral Pain Syndrome (PFPS) Severity Scale, a self-reported instrument used for patients with PFPS. Four bi-lingual translators were involved in the translation and cultural adaptation procedures. Eighty-seven patients with PFPS (51 women and 36 men) participated in the study. To establish test–retest reliability, the patients were asked to complete the PFPS Severity Scale twice at initial visit; before and after physiotherapy treatment. The Greek version of the Knee Outcome Survey-Activities of Daily Living Scale (KOS-ADLS) was also administered once. Internal consistency of the translated instrument was measured using Cronbach α . An intraclass correlation coefficient was used to assess the test–retest reliability of the PFPS Severity Scale. Concurrent validity was measured by correlating the PFPS Severity Scale scores with the KOS-ADLS scores using Pearson's correlation coefficient. The results showed that the Greek PFPS Severity Scale has good internal consistency (Cronbach $\alpha = 0.949$), test–retest reliability (ICC = 0.946) and concurrent validity ($r > 0.7$). In conclusion, the Greek version of PFPS Severity Scale is a reliable and valid measure when administered to patients with PFPS.

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Introduction

Patellofemoral pain syndrome (PFPS) is one of the most common knee problem physicians have to confront, and the

second most common musculoskeletal complaint presented to physiotherapists [1,2]. PFPS is characterized by diffuse retropatellar or peripatellar pain during functional activities such as stair climbing, squatting and prolonged knee

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flexion while sitting [3,4]. It represents 70% of anterior knee pain (AKP), affects mainly young active adults and is associated with abnormal loading of the patellofemoral joint, malalignment of the lower extremity and/or the patella, overactivity, and muscular imbalance of the lower extremity [5].

The PFPS Severity Scale [6] is a useful instrument used to measure patellofemoral pain associated with functional activities. It consists of 10 questions regarding PFPS pain in a visual analogue scale (VAS). Each VAS line is 10 cm long and the end point descriptors are "none" and "unbearable". A box with a statement of "not attempted" accompanies eight out of 10 questions because not all activities are undertaken by the person with PFPS; either because they are too painful or they are not in their regular weekly routine. It is a relatively new scale compared to other common and popular scales such as the AKP Scale (AKPS), [7] and it has only been translated and culturally adapted into Chinese [8]. The PFPS Severity Scale is also used increasingly by researchers in the field [9,10]. However, there is no Greek version of the PFPS Severity Scale available at present. In order to administer this questionnaire to a Greek-speaking population, a rigorous process of cross-cultural adaption and validation is needed. Thus, the aim of the current study was to translate and culturally adapt the PFPS Severity Scale into the Greek language and culture and to test its validity and reliability.

Methods

The official guidelines of the cross-cultural adaptations were used in the current study [11,12]. Therefore the following three phases had to be followed: (1) translation and adaption into the Greek culture and language; (2) assessment of the comprehensibility of the pre-final version and modification; and (3) the assessment of validity and reliability of the final version. The authors obtained approval from the first author of the original AKPS to translate and culturally adapt the questionnaire into Greek.

Translation and cultural adaption

The first step was the forward translation of the English (original) PFPS Severity Scale into Greek by two independent translators (D.S. and C.P.), who are Greek in origin. Both translators aimed to translate the scale conceptually rather than literally. In their written reports, they recorded their comments and difficulties during the translation process and the criteria used to make their decisions. The two reports were then compared and discussed amongst them and a consensus was reached. Therefore, a single Greek version of the scale was created from the two reports and the comments of the two translators. This version was then translated back into English by two official English translators (M.A. and L.N.), who compared the scale with the original one to confirm whether the semantic, conceptual, and experimental equivalence was met. The pre-final translation was constructed by a group of experts, after examining these two English versions. This pre-final version was then used for pilot testing.

Piloting the pre-final version

The pre-final version of the scale was tested in a group of 35 participants consisting of students and staff of the European University of Cyprus (EUC) who reported to have PFPS (19 women and 16 men), mean age: 32.1 ± 12.8 years. They were all native Greek speakers. All participants were asked to complete the questionnaire by reading the instructions. Each participant was asked to provide the research team with any comments on the questionnaire or words that were difficult to apprehend. All questions and answer options were found to be well conceivable by all participants. Thus, no further changes were made to the pre-final version.

Reliability and validity of the final Greek version of the PFPS Severity Scale

Subjects

Participants were recruited from 10 different private physiotherapy clinics in Athens, Greece. Patients between 18 and 45 years old were included in the study if, at the time of presentation they had been evaluated as having clinically diagnosed PFPS for at least 4 weeks [3–6]. PFPS was defined as a syndrome in which the pain was located around or beneath the patella that could be reproduced with retro-patellar palpation or patellar compression [3,4]. All patients were referred for physical therapy by a private practice doctor or by the National Health Sector. However, all participants were examined by a physical therapist to evaluate if their symptoms were attributable to soft tissue lesions. Moreover, patients over the age of 45 were excluded to control for the possible effects of degenerative joint disease [13]. Finally, informed consent was obtained from all participants. The study protocol was approved by the Ethics Committee of the European University of Cyprus, Cyprus. The study was conducted in accordance with the Declaration of Helsinki.

Procedures

In order to assess test–retest reliability, the participants were asked to complete the Greek version of PFPS Severity Scale twice during their initial visit to the physiotherapy clinic. The first was before and the second was right after their first treatment. Physiotherapists assessed the participants in the first treatment. This initial physiotherapy session was considered unlikely to elicit any noticeable effects. The same process was followed by Irrgang et al in the original work for the development of the Knee Outcome Survey-Activities of Daily Living Scale (KOS-ADLS) [14]. The test–retest reliability was established by comparing the results of the first with the second PFPS Severity Scale. The total score of the PFPS Severity Scale was normalized to 100 after considering the number of the questions patients completed. For example, if a patient answered only eight questions out of 10, and scored 42/80, the total score was $52.5/100$.

To assess concurrent validity, the results of the PFPS Severity Scale were correlated with the results of the Greek version of KOS-ADLS [15], a scale that all patients were asked to complete along with the PFPS Severity Scale before treatment. The KOS-ADLS is a scale designed

to measure symptoms and functional disorders of the knee joint [14]. It has been translated into different languages such as Portuguese, Turkish, and German [16–18]. In addition, this scale was found to be extremely reliable, valid, and responsive for knee disorders [14].

Statistical analysis

The analysis was performed with SPSS Statistical Package for Windows (v. 20, IBM, New York, USA). The statistical level of significance was set at $p < 0.05$. All data were tested for normal distribution using the Kolmogorov-Smirnov test. If the criterion of normality was met, parametric tests were used. Otherwise, non-parametric statistics were used. Test–retest reliability of the item and total scores of the PFPS Severity Scale was evaluated by using the intraclass correlation coefficient (ICC) with a two-way random model and type: absolute agreement [12,19]. The smallest detectable difference (SDD) was calculated based on the data obtained from the test–retest reliability analysis. Internal consistency was estimated using Cronbach α , a measure which indicates the strength of the relationship between the items within the questionnaire [20]. A Cronbach α value greater than 0.80 was considered as acceptable [21]. Concurrent validity was tested by examining correlation of the KOS-ADLS data with PFPS Severity Scale data collected before and after treatment using Pearson's product moment correlation coefficient.

Results

Patients

In the reliability study, 87 patients took part (51 women and 36 men); mean age: 25.9 ± 17.1 . All patients represented different educational status. Forty patients (25 women and 15 men) had tertiary education and 47 patients (26 women and 21 men) had secondary education. This ensured that the scale was comprehensible for all patients regardless of their educational background.

Descriptive statistics

The mean PFPS Severity Scale score recorded in the first assessment was 58.8 (SD = 7.7; range = 42.5–76.1). The corresponding score at re-test was 59.0 (SD = 8.9; range = 30.0–76.4). The mean value for the KOS-ADLS was 46.6 (SD = 4.2; range = 35.7–58.1).

Internal consistency and test–retest reliability

The internal consistency was high (Cronbach $\alpha = 0.949$) (Table 1). The results of the test–retest reliability analysis showed that PFPS Severity Scale total score had excellent test–retest reliability (ICC = 0.946; SDD = 1.87). Analysis of individual item scores also revealed good test–retest reliability (ICC > 0.8). The question with the lowest ICC was about running/sprinting and the question with the highest ICC was about kneeling on knees (Table 2).

Table 1 Test–retest reliability and internal consistency of the PFPS Severity Scale

ICC	95% confidence interval	SEM	SDD	Cronbach α
0.946	0.721–0.988	0.46	1.87	0.949

Cronbach α = the measurement to assess internal consistency of the scale items; ICC = intraclass correlation coefficient; SDD = smallest detectable difference; SEM = standard error of measurement.

Validity

Concurrent validity was estimated by correlating the results of PFPS Severity Scale (before and after treatment) with those of KOS-ADLS scores. All correlations were statistically significant. The correlations are presented in Table 3.

Discussion

This study has shown that the Greek PFPS Severity Scale has good internal consistency, test–retest reliability, and concurrent validity when correlated with the KOS-ADLS. These findings reveal that the translated instrument is a reliable and valid outcome measurement for patients with PFPS who are native Greek speakers.

According to previous research one of the best ways to measure test–retest reliability of an outcome measurement is by calculating the ICC and SDD. The ICC shows the item conformity of a scale when the same results are reproduced [12]. To have a better interpretation of the reliability data, the SDD also needs to be examined [20]. The SDD value found in this study is 1.87. Change that exceeds the SDD value would reflect a real clinical change.

Table 2 Test–retest reliability of each item of the PFPS Severity Scale

Questions	ICC	95% confidence interval
Climbing stairs	0.893	0.823–0.929
Squatting down	0.911	0.876–0.934
Walking	0.890	0.871–0.938
Jogging	0.956	0.916–0.979
Running/sprinting	0.823	0.794–0.872
Participating in a sport	0.901	0.878–0.932
Sitting with knees bent (for 20 min)	0.899	0.867–0.926
Kneeling on knees (for any amount of time)	0.961	0.944–0.986
Pain at rest/sleeping	0.889	0.853–0.937
Pain while resting following activity	0.894	0.865–0.933

ICC = intraclass correlation coefficient between pre- and post-treatment of each question.

Table 3 Correlations between the scores of PFPS Severity Scale and KOS-ADLS

	Correlation with KOS-ADLS	<i>p</i>
PFPS Severity Scale score (first)	$r = 0.763$	$<0.001^*$
PFPS Severity Scale score (second)	$r = 0.704$	$<0.001^*$

r = Pearson's correlation coefficient.

* $p < 0.001$.

The SDD value established in this study would be useful in future clinical trials to determine whether the reported change in PFPS score after treatment is beyond that due to repeated measurements.

The Cronbach α value was used to measure the internal consistency of the Greek PFPS Severity Scale [22]. A Cronbach α value between 0.70 and 0.95 is generally regarded as satisfactory. A value less than 0.70 indicates that there might be limited intercorrelations among the test items and that the items may not be measuring the same attribute. By contrast, a very high value (more than 0.95) may suggest that some items are redundant [23].

The Greek version of the KOS-ADLS was used to evaluate the concurrent validity of the Greek PFPS Severity Scale. Our results showed that the Greek version of the PFPS was highly correlated with KOS-ADLS, thus demonstrating good concurrent validity. Taken together, the Greek PFPS Severity Scale demonstrated acceptable psychometric properties.

The results of the present questionnaire were comparable with those of the Chinese version [8]. In the Chinese translated version of the PFPS, Cronbach α values were above 0.85 and test–retest reliability was 0.98. In the English version, the test–retest reliability was 0.95 and the correlations between the PFPS and the Western Ontario and McMaster Universities Arthritis (WOMAC) Index and Hughston Foundation subjective knee scale were strong ($\rho = 0.72$ and 0.83 , $p < 0.001$ respectively) [6].

Limitations

A limitation of the study was that no responsiveness of the PFPS Severity Scale was measured. In addition, comparison of test–retest reliability between male and female patients with PFPS was not conducted as had been done in other previous studies [15]. Another limitation of the present study was the homogeneity of the sample. Although the PFPS Severity Scale is a disease-specific instrument and patellofemoral pain usually affects young adults, the results cannot be generalized to older adults with patellofemoral osteoarthritis. The test–retest reliability was examined comparing the scores between the first and second administration of PFPS Severity Scale which took place before and after the initial treatment within the same day. This methodology presents two disadvantages: (1) the risk of error because of patient recall due to the short time interval between the administrations of the questionnaire; and (2) the risk of error as a result of the physical therapy treatment between the two measurements.

However, A longer period between the first and second administration of the questionnaire (e.g., using a 1-week interval) may lead to other errors. For example, there may be a higher chance of alterations in the patients' health status due to the increased time interval between testing sessions (e.g., history effect, maturation effect) The changes in health condition may then in turn affect the ratings. Therefore, it is difficult to determine the most appropriate time interval between repeated measurements [12]. Additionally, the methodology chosen in the current study for reliability testing has been similarly followed by other studies [14].

Conclusion

The Greek version of the PFPS Severity Scale was reliable and valid when used in adult patients with PFPS. The results of the psychometric characteristics were compatible with those of the original English version. The Greek PFPS Severity Scale could be applied in a Greek-speaking population to assess symptoms and functional limitations in patients with PFPS. It provides a useful assessment tool for cross-cultural research in PFPS.

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